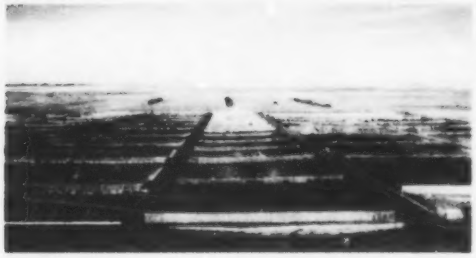
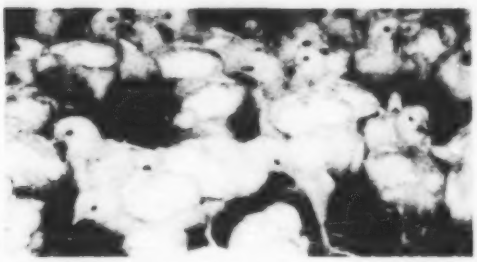
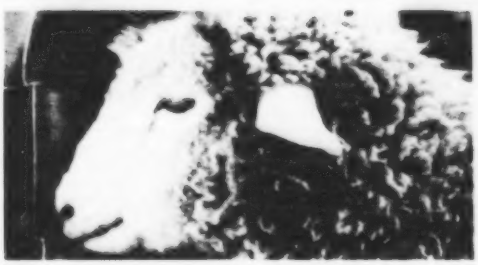
Saskatchewan
Agriculture
and Food



# Establishing and Managing Livestock Operations





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## 1.0 Introduction

The livestock industry contributes significantly to Saskatchewan's farm income and provides important job opportunities. The livestock industry is expanding and has the potential to provide large returns to the province and its citizens. It is a diverse industry with many types of operations.

Farming practices evolve over time, and society's standards change. Today, society demands a greater voice in environmental issues, including the conduct of farmers.

### The Agricultural Operations Act

*The Agricultural Operations Act* balances environment responsibilities with the realities of agricultural production.

The main provisions of the Act include:

- protection for farmers from unwarranted nuisance lawsuits;
- a mechanism for resolving nuisance disputes between agricultural producers and their immediate neighbours; and
- protection of ground and surface water by proper management of manure and animal waste.

### Normally-Accepted Agricultural Practices

*The Agricultural Operations Act* protects farmers who are using normally-accepted agricultural practices. A normally-accepted agricultural practice is defined as a practice that:

- is conducted in a prudent and proper manner that is consistent with accepted customs and standards followed by similar agricultural operations under similar circumstances, including the use of innovative technology or advanced management practices in appropriate circumstances;
- is conducted in conformity with any standards established pursuant to the regulation; and
- meets acceptable standards for establishment and expansion.

### Nuisance

Nuisance is any activity causing unreasonable and substantial interference with another's quiet use and enjoyment of property. Agricultural nuisances include flies, dust, noise, odours and pests, but does not include pollution of streams, rivers or aquifers.

### Guidelines

This document describes normally-accepted practices for establishing and managing livestock operations. These guidelines cannot cover every conceivable type of practice or situation. In preparing these guidelines, Saskatchewan Agriculture and Food has tried to balance the competing interests of agricultural producers and their neighbours, as well as reconciling the regional and cultural differences that exist within the province. This document will change as farming practices evolve.

### Agricultural Operations Review Board

The Agricultural Operations Review Board will review complaints of nuisance and determine whether the disturbance results from the use of a normally-accepted agricultural practice. The board will encourage parties to resolve nuisance disputes locally without resorting to a formal board hearing. If a hearing is held, the board can dismiss the complaint or recommend ways to meet normally-accepted agricultural practices. Decisions of the board will take local conditions and circumstances into account. The Agricultural Operations Review Board is not bound by these guidelines. Board decisions may necessitate change to the normally-accepted agricultural practices described in this publication.

## 2.0 Establishing or Expanding Livestock Operations

It is important to expand or establish livestock facilities in a manner that is both acceptable to neighours and environmentally safe. Good sites will have minimal impact on neighbours and the environment. Choosing a good site will reduce establishment costs and provide room for future expansion.

The public has an important role to play in the development or expansion of livestock operations.

People moving to rural areas or areas which include livestock production must realize that growth and expansion of livestock operations is the trend, and should be expected. For new livestock development, the public must be open to constructive participation in the planning process. An open and direct approach by both developers and the public will reduce suspicion and improve local acceptance.

When hearing a complaint, the Agricultural Operations Review Board may consider whether an agricultural operation was established according to acceptable standards, including what other development existed when the livestock facility was established.

## Public Process to Establish Livestock Operations

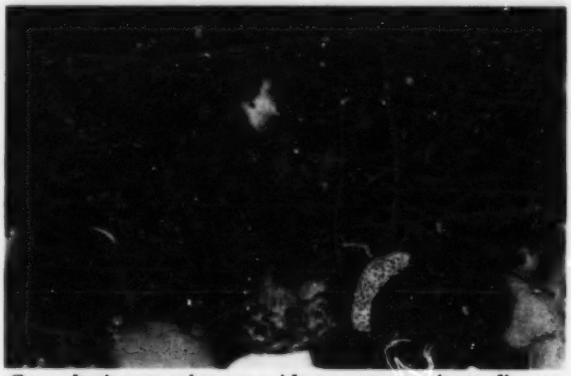
Developing a livestock operation requires extensive planning. The public may have concerns that a project will adversely affect them or the environment and may expect to have input into the site selection process. As a result, developers of livestock operations must be sensitive to their neighours' concerns and consult with them.

Good communication is essential. Developers must be open to the public, explain what is proposed and assure concerned neighbours that the design and operation of the facility will have minimal impact on their quality of life. Good communication encourages the public to be objective, willing to consider the issues and willing to work with developers to resolve local concerns.

Initiate communication with the local rural municipal office. Municipal councillors know the area well, are often leaders of community opinion and in many cases will have discretionary approval authority. Municipal bylaws may also require specific public notification or meetings. Contact with nearby urban municipalities will also be helpful in developing local business support and in avoiding unnecessary conflict with urban expansion.

When choosing a location and designing a project, identify local residents, business operators, community and recreational uses and affected land owners. Define the project benefits, opportunities, and potential problems and how those problems can be overcome.

A well-conducted, and documented, public process can provide valuable information to approving agencies. Results of the public process help to identify any outstanding issues, and allow the proponent and community an opportunity to develop cooperative solutions to any outstanding issues. Municipal councils and provincial agencies will be more comfortable in their decision-making in knowing that there has been an opportunity to identify and resolve any particular issue.



***Consultation meetings provide an opportunity to discuss details of a proposal.***

Discuss your plans for public process and community participation with the local municipality to determine if the process is complimentary to local bylaw requirements and appropriate for the proposal and the host community. Some municipalities, as part of the approval process for a municipal development permit, may have specific requirements for public meetings or notice.

The public will want to know as much as possible about the developer and the project. The developer must be willing to discuss all details about the project, except for confidential information or information prevented by law from being released. The developer can convey the message in one or more of the following ways:

*Personal Consultation*

Personal consultation with key people and neighbours will keep them informed over the life of the project and help to avoid unfortunate surprises.

Personal, one-on-one contact, is the best communication technique.

*Open Houses*
Open houses present a valuable opportunity for developers to meet with interested individuals in the project. Visitors can review information describing the project, talk with the developers and resource people and register any views they have about the project before they leave. Any concerns expressed through the open house process should be acknowledged as soon as possible.

*Publications*
Publications can be used to describe the project. They can outline both the positive aspects, as well as steps taken to minimize any negative concerns. A tear-off return postcard can be attached to solicit responses. Distribution of the publications can be handled through local mail or the community newspaper. Responses should be followed up in person or in writing.

*Workshops*
Planning workshops enable people with a variety of views to work together. Representatives of the project, citizens' groups, organizations and government agencies can meet together to review the issues and resolve them. Workshops are a useful tool to develop local solutions to concerns raised at an open house.

*Reference Centres for Project Information*
Place copies of descriptive and technical information at neutral locations, such as the library or the municipal office, so people may access information about the project.

*Public Meetings*
Public meetings can be used to make presentations and can be followed by a question-and-answer period. This format can become a forum for expressing opposing views on the project instead of a cooperative effort to find solutions. It is important to set an agenda and to choose a strong chairperson, perceived as neutral by both sides, to lead the meeting and to focus on developing solutions, rather than pointing out problems.

Expending time and effort to explain the project to stakeholders as it develops is better than trying to defend decisions later. Community participation in a project will foster local support.

## Locating Livestock Facilities

A good site has many positive social and economic benefits, however it is difficult to find a site with all the desired features. Evaluate sites from both a developer's and community perspective.

Site selection involves practical, technical and environmental factors. Observe the following points when selecting a site for a livestock operation:

*Practical*
- Select a site that lends itself naturally to the operation. Make use of naturally occurring windbreaks, shelter belts and other landscape features which provide protection and visual screening.
- Select a site that has good drainage away from buildings and facilities. Proper contouring of the ground provides for drier pens and better animal performance. Select a soil that will maintain its contour.
- Ensure there is adequate area for holding ponds or other environmental control structures.
- Allow extra space for future expansion. Successful livestock operations tend to expand over time.

***A well-developed site.***

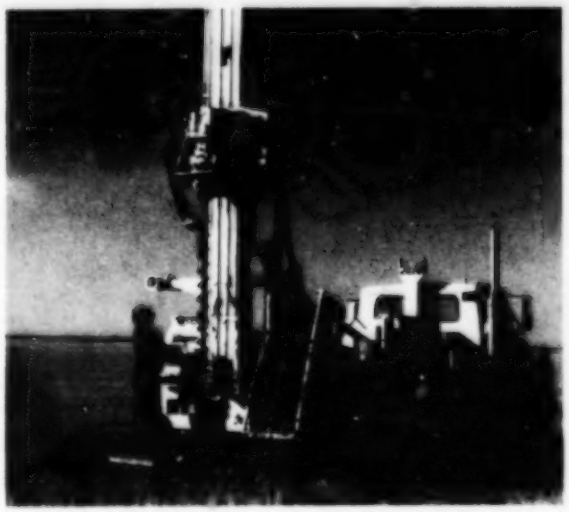
*Technical*
- Evaluate present and future land-use in the surrounding area, such as proximity to neighours and residential development. Recreational areas may be more sensitive to new livestock

development than traditional farm communities. Local support in the community will help avoid ongoing problems in the future. Observe the preferred separation distances listed in Table 1.

- Avoid areas with resort and recreational facilities, which may result in conflict, such as motels, parks, campgrounds, resort villages or golf courses.
- Avoid locating a livestock facility at an elevation higher than the surrounding area to minimize the effects of an atmospheric inversion. An inversion usually occurs under calm conditions, often on a cool summer evening after a warm day and can carry odour a considerable distance with minimal dispersion.
- Ensure the availability of utilities such as power, water and telephone.
- Ensure the availability of inputs such as livestock, feed supplies, labour and support services.
- Develop a traffic management plan for the delivery and removal of products and byproducts to reduce dust and noise.
- Select a site with an all-weather road for moving livestock, feed, manure and other by-products. Municipalities can require specific road maintenance agreements for activities not located on a provincial highway.
- Evaluate any herd health restrictions, such as isolation to other livestock facilities your operation may require, or that existing operations in the community may have.

*Environmental*

- Develop a plan to store and utilize manure and manage waste in a way that will minimize the impact on the environment and neighbours. Manure is a valuable by-product of any livestock operation.
- Obtain access to enough land suitable for spreading manure.
- An engineering study may be necessary to evaluate soil and groundwater conditions and to determine the environmental constraints or opportunities for development of a site.



***Collecting soil samples.***

## Compatibility with Nearby Land Use

Odour, noise, dust and flies are a normal part of livestock operations. Good management will minimize the impact but not entirely eliminate them. The level of disturbance will depend on the size of operation, the type of livestock and manure management system and the location of the facility. A minimum separation to neighbours allows the best chance for normal management practice to minimize any disturbance.

Most municipalities with land use bylaws will specify separation requirements for siting intensive livestock operations. Where no municipal bylaw is in effect, use the preferred separation distances in Table 1.

**Table 1**

**Preferred Separation Distance** (In Metres)

| | Animals Units | | | | | |
|---|---|---|---|---|---|---|
| **Population** | **10-50** | **50-300** | **300-500** | **500-2000** | **2000-5000** | **>5000** |
| Rural Residence | 300 (450) | 300 (450) | 400 (600) | 800 (1200) | 1200 (1600) | 1600 (2000) |
| <100 | 400 (600) | 400 (600) | 800 (1200) | 1200 (1600) | 1600 (2000) | 2000 (2400) |
| 100-500 | 400 (600) | 800 (1200) | 1200 (1600) | 1600 (2000) | 2400 (2400) | 2400 (2400) |
| 500-5000 | 800 (1200) | 1200 (1600) | 1600 (2000) | 2400 (2400) | 3200 (3200) | 3200 (3200) |
| >5000 | 800 (1200) | 1600 (2000) | 2400 (2400) | 3200 (3200) | 3200 (3200) | 3200 (3200) |

***Numbers in brackets are preferred for open liquid manure storage.***

This table provides preferred seperation distances for siting livestock operations in Saskatchewan.

Avoid locations, where a residence will be closer than 300 metres to the development or 450 metres to an open liquid manure storage facility. Larger developments and urban centres require greater separation to avoid conflict.

Separations less than those provided in Table 1 may be appropriate when adjoining land residents or urban centres agree to the development. This determination may be possible through open public consultation and when it can be demonstrated that development impacts are not adverse. Consents should be confirmed in writing.

Major urban centres may be involved with adjacent municipalities as part of a formal planning district. This allows urban input into nearby rural development so that potential conflicts may be avoided. The rural municipality will have information on the development process within a planning district or commission.

### Permits, Approvals and Licenses Required

Before construction of a livestock facility, approval may be required from, but is not limited to, any of the following agencies:

- Saskatchewan Agriculture and Food
- The municipality in which the livestock operation will be located.
- SaskWater
- Saskatchewan Environment and Resource Management
- Saskatchewan Highways and Transportation
- Saskatchewan Municipal Affairs and Housing
- Saskatchewan Health

Other agencies such as railroads, wildlife organizations, regional parks or resort areas that may be affected by your proposal should also be contacted.

For more details on the type of approval required, local and provincial contacts for each agency are provided in Appendix A.

## 3.0 Managing Livestock Operations

Most livestock operations result in little impact on the use and enjoyment of a neighbour's property. There are, however, certain activities which may cause some inconvenience, and which neighbours should be prepared to live with.

In these situations, the degree of nuisance is determined by the frequency, intensity, duration and offensiveness of the disturbance. This can be described as the FIDO equation.

**FIDO = Frequency x Intensity x Duration x Offensiveness**

Reducing any one of the FIDO factors will reduce the nuisance perceived by a neighbour. Livestock operators can be sensitive to a neighbour's concerns by managing their operations to minimize each of the FIDO factors.

*Frequency*

The frequency of a disturbance refers to how often the disturbance occurs. The perceived nuisance of an activity will increase if the activity occurs daily, as opposed to an activity that may occur only once per year.

*Intensity*

Intensity refers to the relative strength, degree or extent of a disturbance. Intensity is generally reduced by providing reasonable separation between the source of a disturbance and the receptor. For odour, European studies show the greatest benefit of separation distance occurs in the first 300 metres. The incremental benefit of increased separation diminishes with increased distance.

*Duration*

Duration refers to the length of time a particular activity lasts. Although manure spreading may be done only once per year, it may be seen as a nuisance if it takes many days or weeks to

complete. Swift and timely completion of any potentially disturbing activity will reduce the likelihood of complaints.

*Offensiveness*
Some activities are naturally more or less offensive than other activities. Where the inherent offensiveness of an activity cannot be reduced through improved management or technology, paying close attention to the three previous FIDO factors is important. Do not rely on "cure-all solutions" to replace sound management practice.

## Site Management

The appearance of a livestock facility affects the public's perception of how well it is operated. Neat, clean and well-kept facilities are usually perceived as being well-operated and may be less subject to complaints. Attention to detail pays off in the long term.

Landscape the site and keep the grass mowed. Arrange buildings and equipment in an orderly fashion.

***A well-kept yard.***

Plant trees and shelter belts to improve the appearance, disperse odours and hide unsightly areas and manure storage facilities. Facilities which are out of sight of highways and municipal roads will attract less attention.

## Managing Ventilation Systems

The ventilation system for confined livestock facilities is critical to maintaining the comfort and health of livestock and employees in the facility. Exhaust air from these facilities contains dust, odour, heat and moisture. Traditionally, fans exhaust stale barn air through barn side walls. Directing exhaust air toward the ground, and away from adjacent residences, will help trap dust and debris that leaves the barn through the exhaust fans.
Some facilities exhaust air through the roof. This system has been used in Europe for some time and may provide effective odour control. Although some Saskatchewan producers are using the chimney exhaust system, it is not common.

## Manure Management

A manure management system consists of manure collection, storage facilities and equipment for land application or treatment of manure. Solid, semi-solid and liquid manure systems are used in Saskatchewan. A well-designed manure management system is an important part of any livestock operation.

*Solid manure systems* are used for most feedlots and some barns. Solid manure accumulates in the feedlot or barn area where the animals are confined until the pen or barn is cleaned. The decomposition of manure creates heat that, in combination with straw for bedding, is important to animal health and comfort during the winter.

Locate feedlots and other dry-lot areas on well-drained sites with the proper slopes. Fill low spots in the pen areas and build mounds to provide a dry area for the animals. Well-drained feedlot areas will yield better animal performance, require less fly control, accommodate better manure management and reduce odour. Well-drained pens with early spring mounding of manure allows speedy removal of manure from the pens to the fields.

*Semi-solid manure* results when limited bedding is provided to confined animals. This is common in dairy and some swine and poultry facilities. Although adding water allows the manure to be handled as a liquid, significant volumes may be required. Specialized equipment allows semi-solid manure to be transferred to long term storage as a liquid and then handled and applied to the land as a solid.

*Liquid manure* is used in animal confinement systems that do not use bedding, such as swine and laying hens. Wash water and spillage or

leakage from waterers dilutes the manure and allows it to be handled as a liquid.

### • Manure Collection

Solid manure systems, such as feedlots and some deep bedded barns, allow manure to accumulate over the entire area of animal confinement. Straw is provided to keep the animals warm and dry. Animal performance is maximized and odour and flies are minimized by providing a well-drained site. Keeping solid manure as dry as possible and removing it from the barn regularly, or mounding it in the pens, will improve animal comfort, worker health, and control odour and fly breeding.

Semi-solid systems use specialized equipment to collect manure and transfer it to long term storage. Equipment usually consists of scrapers or belts to convey the manure to a positive displacement "ram" pump where it is transferred to long term storage, usually a "mound" outside the building. The collection and transfer are usually done daily.

***Piled manure allows pens to dry.***

Liquid manure systems collect the manure in pits or gutters beneath partially or totally slatted floors, where it is stored for a short period of time and then transferred to medium or long-term storage. Some barns remove manure from the pits to a tanker and immediately land apply the manure. Due to the limited storage available in pits, this necessitates frequent removal of the manure and is practical for only relatively small volumes of manure.

Maintain a healthy barn environment by limiting the time manure is stored in the barn. Properly installed floors, gutters and drains will keep the animal confinement area dry and improve the indoor environment for the animals and workers.

### • Manure Storage

Locate the manure storage site where it will not impact on water quality, fits with management of the livestock facility and is consistent with requirements for set back from neighbours, roads or other landscape features. Shelter belts and fences around the manure storage area will screen the site, reduce the wind speed and help to disperse odour.

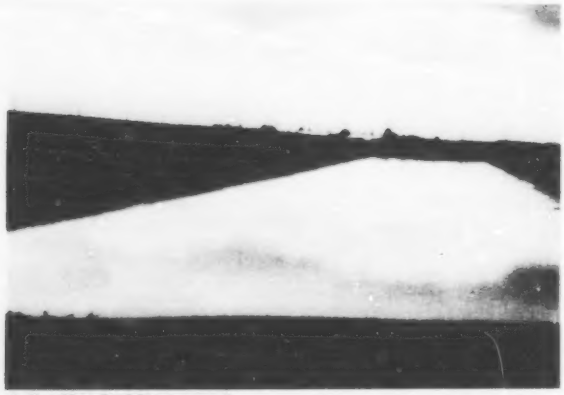
***An earthen manure storage facility.***

Collecting solid manure from feedlot pens on the frost during spring thaw results in drier pens and a firm surface which improves animal performance. Once removed from the barn or feedlot area, solid manure can be stockpiled or land-spread. It is common to stockpile manure early in the spring while the frost will support heavy equipment, and to land-spread the manure later during the growing season.

Holding ponds contain contaminated runoff from storage areas for solid or semi-solid manure systems. Holding ponds are usually designed to operate as evaporation ponds, but there may be a need to empty the holding ponds during periods of excessive runoff. Feedlots and other livestock operations using solid manure require adequate area to allow for the containment of contaminated runoff.

Liquid manure is stored in tanks or earthen manure storage areas adjacent to, or near, the barn. Some types of liquid manure form a crust that floats on the surface of the manure. This naturally occurring crust is very beneficial in controlling odour that results from the anaerobic decomposition of liquid manure.

If a crust does not form naturally, barley straw can be applied to the manure surface to control the odour.



***A feedlot holding pond.***

Saskatchewan is the world-leader in the development and use of straw to control odour from earthen manure storage. Before using barley straw on the surface of a liquid manure storage, ensure that the manure removal and application equipment is capable of dealing with the extra material.

Earthen manure storage areas can be managed to control odour by:

- bottom loading manure to reduce disturbance of the manure surface;
- reducing the amount of manure stored during summer months;
- maintaining a storage level that is below grade to minimize the effect of wind; and
- applying good quality barley straw to the manure surface if a crust does not naturally develop.

***Straw being applied to lagoon.***

Emerging technologies to treat manure are discussed in a later section of this publication.

*Size of Storage*

Size liquid manure storage facilities according to the desired frequency of spreading manure, taking into account:

- water pollution control and nutrient utilization;
- access to fields;
- potential for expansion of the livestock facilities; and
- controlling odour.

Six months' manure storage is the minimum to allow operators enough flexibility to maximize the value of manure and avoid the need to "dispose" of manure during winter months when access to fields is limited, and nutrient use is minimized. Twelve months' manure storage allows the greatest flexibility in managing manure. Multi-year manure storage can result in more severe odour and is generally not recommended.

Livestock operations with limited liquid manure storage will need to spread frequently, often to the point where neighbours may perceive the process as continuous. This greatly increases the potential for complaints. Manage limited storage facilities by cleaning out tanks completely and reduce volume requirements by minimizing water spillage and wash water.

### • Manure Application

Emptying liquid storage facilities, cleaning outdoor pens and spreading manure is a necessary activity for a livestock operation and may create some inconvenience for nearby neighbours. A good-neighbour policy, combined with good management, will minimize the inconvenience.

Odour during spreading can be reduced but not eliminated.

*Timing*

Time the season of manure application to achieve the best balance between nutrient use efficiency, access to fields and the likelihood of conflicting

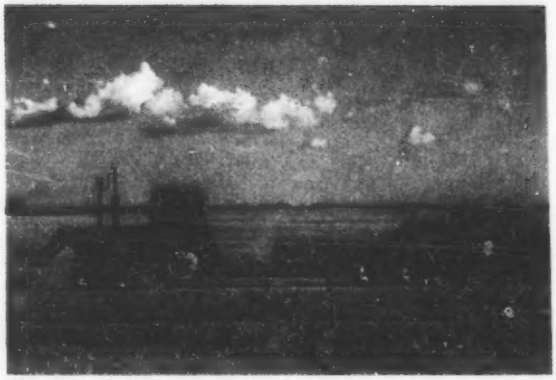
events. Early spring and late fall are generally the best time to land-apply manure. Neighbours spend less time outside during those times of year and are less likely to be affected. In the spring, fields must be dry enough to accept the manure and application equipment and to allow incorporation of the manure into the soil. In the fall, wait until the crop is harvested and then apply the manure before freeze-up.

Avoid spreading manure near neighours on weekends or other holidays when the impact may be less tolerable. Neighbours can assist livestock operators by advising the operator of any potentially conflicting events well in advance so that the operator may schedule manure application at a time, or in areas, which are less likely to affect the event. Good two-way communication is a necessity.

If small quantities are being spread daily or weekly, surface apply in the morning when the air is warm and rising, rather than in the late afternoon when it is cool and falling. Acceptable air quality can be maintained by spreading manure when weather conditions are favorable.

*Frequency and Duration*
Reducing the frequency and duration of the manure removal and application process will minimize the possibility for conflict with neighours. Whenever possible, manage manure so that it is spread only once or twice per year. This allows for improved nutrient utilization, planning and overall efficiency. When manure is being removed and applied, complete the activity in as short a time frame as possible. The operator of a livestock facility will need to use his best judgment and consult with neighours to achieve this goal.

*Spreading Solid Manure*
Solid manure is sometimes piled in fields, leveled and then soil incorporated. Incorporating the manure within 24 hours of leveling or spreading will minimize the potential for complaints of nuisance.



***A solid manure wagon.***

*Applying Liquid Manure*
Liquid manure is directly soil injected or surface-spread. Systems that inject liquid manure into the soil release the least odour. Incorporation of surface-spread manure within 24 hours of application is recommended. Manure tankers using a high-trajectory spray for incorporation should only be used for isolated sites.

Big-gun irrigation systems are suitable only for isolated areas. The use of big-gun application systems requires careful attention to location, application rates and wind.

***A direct injection system.***

*Consultation*
By informing neighbours in advance of manure application, livestock operators can avoid conflicts with neighbourhood events. Avoid spreading manure on weekends. Neighbours to a livestock operation also have a responsibility to provide the operator with advance notice of events that could be affected by manure application odours.

**Table 2**

| Minimum Recommended Separation Distances for Spreading Manure (metres) | | | |
|---|---|---|---|
| **For Public** | **Injected** | **Incorporated within 24 hours** | **No incorporation** |
| 1-1000 people | 200 | 400 | 800 |
| 1001-5000 people | 400 | 800 | 1200 |
| >5001 people | 400 | 80 | 1600 |
| **For Water Protection** | | | |
| Domestic groundwater supply on land not controlled by the operator | 100 | 100 | 100 |
| Watercourse or body of water not contained on land controlled by the operator to which water runoff will not flow | 30 | 30 | 30 |
| Watercourse or body of water not contained on land controlled by the operator to which the runoff water will flow | 30 | 150 | 300 |

*Environmental*

Some intensive livestock operations must apply manure according to an approved waste management plan. In the absence of an approved plan, apply manure at rates that supply crop nutrients equal to plant nutrient use. This will maximize the fertilizer value of the manure and minimize or eliminate the risk of pollution. Minimize spreading on frozen or snow-covered soil.

Spreading liquid or solid manure on snow or frozen ground is not an environmental hazard if proper precautions are observed. Provincial regulations do not specifically prevent winter spreading; however, it is not a recommended practice, and livestock operators could be held responsible for any damage which may result.

Many small livestock operations have limited manure storage and must spread manure on a regular basis, making winter manure spreading an economic necessity. Most livestock operators avoid winter spreading, due to the reduced fertilizer value of the manure.

Although large livestock producers usually have long term manure storage (300 to 400 days), a late spring or early winter may require some manure be spread on frozen ground or snow as a last resort to prevent a manure storage facility from overflowing.

If the application of manure to frozen or snow covered ground is required, good site selection will minimize the risk of water pollution. Consider the following factors when applying manure during the winter.

- Select land which is relatively flat and does not discharge directly into a watercourse.
- Do not spread on land that is subject to water erosion.
- Select land where any runoff which might occur will be contained on your own land.
- Maintain the minimum recommended separation distance in Table 2.
- Stubble fields are preferred as they are less subject to soil erosion, and there is greater infiltration of the snow melt.
- Spread only enough manure from the storage to get through until spring, including the possibility of a wet spring.
- Minimize excessive nutrient loss by targeting application rates to meet crop nutrient requirements.
- In next year's crop planning, ensure some acres are set aside and available for manure application during the growing season.

Livestock operators who regularly spread manure on snow should consider seeding buffer strips of grass adjacent to watercourses and bodies of water. Buffer strips allow sediment to settle out before reaching a watercourse. In emergencies, a row of bales can be used to act as a buffer strip.

It may be advisable to inform local authorities or neighbours that some winter spreading will be occurring, including an indication of the precautions which are being taken. This will enable the local authorities to knowledgeably respond to any inquiries which may result.

Instruct employees and contract operators on transporting manure and how to deal with spills.

Ensure that all loads are well contained and do not spill onto public roads. It is appropriate to remove any excess manure, or to post the area until the manure is dry, where spills occur.

Keep a detailed record of manure spreading operations. Information such as the date of spreading, the volume spread, where and how it was spread and the weather conditions at the time of spreading can be used to identify specific problems and to make future improvements.

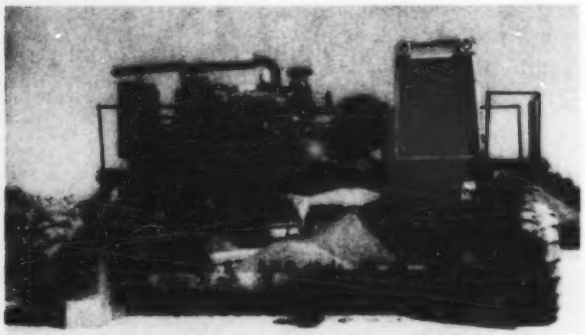
### • Emerging Technologies

Many new technologies have the potential to control odour from manure storage and application, but are not fully developed or field tested. These technologies may be expensive, require a high level of operating skill or simply do not work. Before committing to a new technology, operators should ensure they are capable of managing it.

Some technologies reduce the fertilizer value of the manure. A thorough economic and management analysis is important before adapting any technology.

*Composting*

Composting has had limited use in Saskatchewan. It is better adapted to solid manure than to liquid manure, which can be composted by adding material to reduce the moisture content to 50-65 per cent.



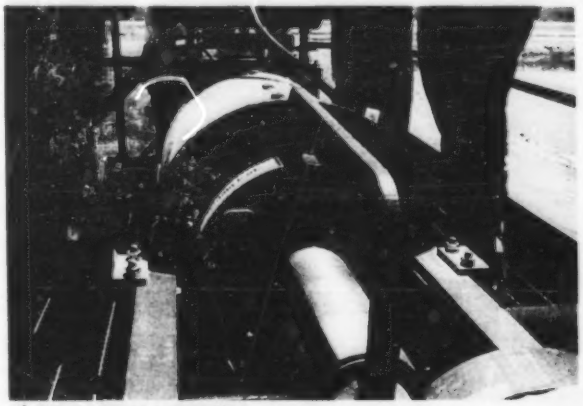
***A compost turner.***

The essential parametres for composting include moisture content, carbon-to-nitrogen ratio, particle size and structure, oxygen supply, temperature, mixing, pH, nutrient balance and inoculation.

A properly managed compost pile is relatively odour-free. An improperly managed composting operation can result in offensive odours. Equipment is available for turning compost piles but the high capital cost makes it uneconomical for small operations. Composting reduces the volume of manure. This is significant for large livestock operations and may make the capital investments for composting feasible.

*Solids/Liquid Separation*

Solids separation allows the remaining liquid manure to be handled more conveniently, and is usually necessary if the liquid portion is to be treated.



***A screw press separator.***

Separation can be accomplished with a system similar to a domestic septic tank. Liquid manure is pumped into storage tanks, where the solids settle out and are periodically removed and field spread. The liquid portion is drawn off the top of the tank. These systems are generally not practical for livestock operations.

Mechanical methods of separating solids from liquid manure include screw presses and mechanical screens. The systems are relatively expensive, but have been tried in Saskatchewan.

The need for two separate manure handling systems is a significant disadvantage of a solids/liquid separation system. Since there is plenty of available land to apply manure, treatment systems are not required and solids separation is not popular. Solids separation has proven successful where there is a comprehensive systems approach to management of manure.

*Constructed Wetlands*

Constructed wetlands mimic the functions performed by natural wetlands. Constructed wetlands are used to treat and remove a variety of potential contaminants from manure. Limited research work has been done in warmer climates for using wetlands to manage manure. Manure entering wetlands must be managed to control nutrient input at a level the wetland system can handle. Plants used in wetlands, primarily cattails and bulrushes, grow well in the Prairies and are readily available.

Use of constructed wetlands will not eliminate the need for field spreading of liquids, but it will reduce the amount of land required. Constructed wetlands designed for the Prairie region will need to treat 12 months of manure in a six month period or less. A manure storage facility with a minimum six month capacity is still required. The high capital cost involved in building such a system is a constraint to wetland development.

*Oligolysis*

Oligolysis is an electrolytic process which captures the sulphur present in a manure slurry. An electrical charge is applied across two iron electrodes. At the positive electrode, iron from the electrode is oxidized into ferrous ions that combine with the sulphur present in the slurry. This process ties up the sulphur and prevents it from participating in other chemical processes that create objectionable odours. Laboratory research in Saskatchewan using liquid poultry manure confirmed the elimination of hydrogen sulphide, but the overall offensiveness of the odour was not reduced.

Research in Alberta concludes oligolysis is effective in reducing odour from swine manure on a laboratory scale. The process is not feasible at a farm scale due to the operational costs. The application of oligolysis to reduce odours from swine manure has not been optimized in terms of electrode size and spacing, and the electrical current requirements. Research in Alberta to reduce odour from hog manure by oligolysis continues.

*Anaerobic Digesters and Methane Gas*

Anaerobic digesters are large tanks used to recover methane gas produced from anaerobic decomposition of manure. Fresh manure is injected into the tanks in controlled quantities, and the temperature and pH levels are controlled.

Methane production is affected by the digester temperature, the manure loading rate, the amount of mixing, digestion time and the characteristics of the manure. Operators of anaerobic digesters require a high level of expertise. Rising energy costs, increasing scale of production and new technology may overcome traditional constraints to methane production.

*Manure Additives*

There are a number of manure additive products available which make a wide variety of claims; odour and solids reduction are the most common. While these additives may work on a limited volume of manure, costs may make them expensive to use in the recommended amounts. Certain products are very successful in limiting single components of odour, such as ammonia.

Livestock producers should view these products with caution. Pilot trials of a product are recommended. Future developments may make them an alternative to be considered.

*Refeeding*

Manure contains nutrients and energy. Attempts have been made to recover these by feeding manure back to livestock. Treatment is usually required to improve palatability, destroy pathogens and reduce odour. The cost of recycling and treatment, combined with the risk of disease transmission, makes adaptation of this process unlikely without other economic benefits. New feeding regimes aimed at maximum utilization of the feed ingredients will reduce the nutrients excreted by the animals and will likely reduce the benefits associated with refeeding.

*Biotechnology*

This is a new area of research with the potential to reduce problems associated with manure storage and application. This technology may stand alone or be used in combination with existing or yet-to-be-discovered technologies. Biotechnology processes may result in by-products that are less odour offensive, have economic potential as a saleable product or for on-farm use and are easier to handle. Some of these processes may also result in reduced quantities of manure.

*Aeration*

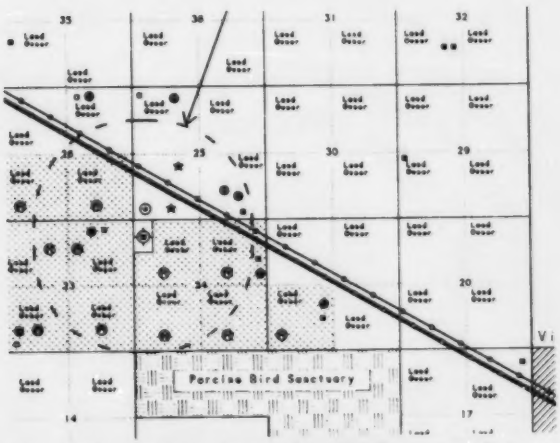
If sufficient oxygen is available, manure will decompose aerobically resulting in decomposition by-products that are less odourous than those resulting from anaerobic decomposition. The amount of energy required to supply a sufficient quantity of oxygen is usually cost prohibitive. Some monitoring is currently being done in Saskatchewan on the effectiveness and efficiency of wind-powered aerators.

## Traffic Management

Livestock operations, as with any value-added industry, will require more trucks to transport raw products and by-products. Manage traffic flow to minimize noise and dust.

A well-prepared traffic management plan will help neighours and the local municipality understand the traffic flow associated with a new or expanding livestock operation. Work with the rural municipality and the Department of Highways and Transportation when selecting routes for the movement of products. Advise contractors, feed suppliers and truckers of preferred and optional routes.

Dust suppression treatments, such as the application of water, are available to minimize dust during times of high traffic volume. Contact the local municipality before applying any substance to a municipal road.




***Maps help people understand traffic flow and other details.***

## Livestock Management

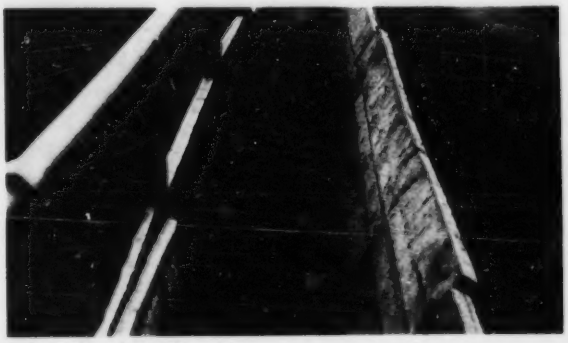
Noise at weaning time is normal and will last a few days until calves and cows adjust. New cattle in a feedlot create noise and dust until they become familiar with their new surroundings.

During the breeding season, game farm animals are noisy. This is normal and occurs only during the breeding season, which is relatively short.

## Feeding and Watering

The storage, preparation and delivery of feed to livestock can create noise and dust. Feed preparation and delivery is a must for any livestock operation.

Keep feed storage areas neat, tidy and, if possible, in areas which are not visible by the public.



***Clean Feed Bunks.***

Remove spilled feed around feedbunks and fence lines and repair leaking waterers in order to minimize fly breeding areas, odour and rodents. Pick up loose trash or debris that may be carried by the wind into neighbouring yards.

Animals confined to pens or barns receive water through automatic watering bowls or nipples. Maintain automatic watering devices to minimize spilled or leaking water, which may complicate manure handling and attract flies.

In some circumstances, such as in pastures, animals are watered directly from dug outs, streams or lakes. Research indicates that animal performance is improved if direct access to water is restricted, and adequate water is supplied by alternative means.

New and improved management techniques and watering equipment are available if it is necessary to restrict the access of animals to surface water. Nose pumps or solar powered pumps can be used to deliver water to a site set back from the watercourse or body water. Ramps can also be constructed to minimize soil erosion along a shoreline.

***A solar pump is efficient and economical for pumping water into troughs.***

## Dead Animal Management

Death of animals is a normal occurrence and represents lost profit to the operator. Even the best livestock producers will have losses between two and three per cent, but higher levels can occur. There are several options available for managing dead animals. For any reportable contagious disease, check with Agriculture and Agri-Food Canada for the recommended disposal method.

### • *Rendering*

Rendering is the preferred method of managing dead animals. Rendering processes the carcasses for other uses, including pet food and commercial animal feed. Storage prior to pickup in the winter should prevent access by predators and birds. In the summer cold storage is required to hold the dead animals before pickup. Some operations have cold storage rooms for dead animals.

### • *Dead Animal Burial*

Burial of dead animals is the most common practice for summer unless cold storage is used. Store small carcasses in a freezer prior to final disposal. Locate burial pits at an isolated site which is at least 90 metres from a watercourse, body of water or any source of domestic water. The bottom of the burial pit should be at least one meter above any water bearing formation and should not be subject to flooding. Cover the carcasses with 0.6 metres (20") of soil. As proper burial during winter months is unpractical, store carcasses at a site that is inaccessible to birds and predators. Bury the carcasses as soon as possible in the spring.

### • *Composting*

Composting is being used by some Saskatchewan poultry producers to dispose of dead birds. Recent research and field trials have indicated that, with proper management, larger animals such as hogs can be satisfactorily composted. A properly operated dead animal composter will not generate offensive odours. The compost operator must ensure that composting, and not rotting, occurs. Locate composting sites at least 90 metres from a watercourse or domestic water supply. Composter sites should be easily accessible for moving dead animals and required ingredients to the site. Upon removal from the composter, field spread and incorporate the compost.

### • *Incineration*

To burn carcasses, use an incinerator that is approved and licensed by Saskatchewan Environment and Resource Management.

### • *Grinding Carcasses*

There is renewed interest in grinding carcasses as a method of managing dead animals. Mechanical grinders are capable of grinding small to medium size carcasses to a pulp which may be composted, or added to the manure storage.

## Pest Management

Flies and rodents normally occur around livestock and livestock facilities. Measures should be taken to control flies and rodents.

### • *Flies*

Livestock operators do not like flies around the livestock enterprise. They bother the animals and reduce animal performance. It is difficult to totally eliminate flies around a livestock operation. A good fly control program that integrates cultural, biological and chemical suppression methods will keep the fly population at an acceptable level.

Cultural control of flies involves managing manure, feed and facilities to reduce fly breeding areas. Keeping manure dry will reduce the habitat for larval development. Potential fly breeding areas include bedding mounds, maternity stalls, sick pens, manure pits, debris on lagoons, wet litter under leaking waterers, feedbunks, fence lines and corners that are difficult to clean. Keep these areas as dry as possible.

Prevent feed spoilage and reduce feed spilled from feedbunks, creep and self feeders, waterers, hay stacks, silage pits and silos, augers, bins and processing areas. Clean up spilled feed on a weekly basis.

Keep manure dry and reduce sources of open water by ensuring there is good drainage. Properly dispose of dead animals.

Biological control methods enhance and preserve naturally occurring predators and parasites that destroy adult flies and fly larvae. To be effective, keep the manure as dry as possible. Under wet conditions, naturally occurring predators cannot move about to find and consume eggs or larvae. Muscovy ducks or parasitic wasps can be used to enhance fly control.

If cultural and biological control do not control flies, insecticides may be required. Chose chemicals carefully and rotate chemical types to prevent flies from becoming resistant. Use only registered insecticides and follow application directions.

### • *Rodents*

Conditions that support a rodent infestation are food, water, suitable climate and shelter. Poorly managed livestock facilities can provide an excellent

***The common rat.***

environment for rodents. Steps to controlling rodents are:

- food source removal – clean up spilled feed and feed ingredients;
- shelter reduction – reduce available shelter by removing piles of wood and junk and by destroying old buildings, particularly granaries;
- rodent proof buildings – use building techniques that make buildings rodent proof (discuss these with your building contractor prior to construction);
- destroy rodents – poisoning is an essential component of a rodent control program. Some operators contract their rodent control program to a commercial firm. The local pest control officer (PCO) is available to discuss baiting techniques with the landowner. The PCO can be contacted through the local RM office.

## Animal Welfare

The humane care and handling of animals is outside the realm of nuisance. Most livestock commodity groups have voluntary Codes of Practice which define high standards for production and handling of farm animals, and, at the same time, promote animal well-being. The codes of practice are available from Saskatchewan Agriculture and Food.

## 4.0 Handling Nuisance Complaints

Agricultural nuisance complaints will be handled by the Agricultural Operations Review Board. Persons with a nuisance concern against an agricultural operation can obtain information or discuss the concern by contacting the Agricultural Operations Office in Regina at 787-4693 or by contacting a Regional Agricultural Operations Specialist at:

| | |
|---|---|
| Saskatoon | 306-933-5322 or 306-933-5095 |
| Yorkton | 306-786-1505 or 306-786-5835 |
| Weyburn | 306-848-2379 or 306-848-2833 |

### Agricultural Operations Review Board

*The Agricultural Operations Act* establishes the Agricultural Operations Review Board. The Board, which is made up of individuals familiar with agricultural practices, will deal with agricultural nuisance issues originating on Saskatchewan farm operations involved in the production of primary agricultural products.

### Agricultural Nuisance Issues

Nuisance generally refers to flies, dust, noise, odours and pests. A person disturbed by a neighbouring agricultural operation should first try to resolve the problem with the operator. If the problem continues, document events relating to the problem, record dates, and the operator's response to discussions.

### Guidelines for Normally-Accepted Agricultural Practices

Guidelines for normally-accepted agricultural practice and codes of agricultural practice have been developed in other provinces and by different agricultural sectors. Guidelines, codes of practice and the expertise of board members will provide the Agricultural Operations Review Board with the necessary background to determine whether an agricultural operation is using normally-accepted agricultural practices.

Guidelines for normally-accepted agricultural practices can also be a useful tool for both parties to resolve a nuisance problem without going before the Board. The person complaining can use the guidelines to determine whether there is a basis for a legitimate complaint, and the agricultural operator can use the guidelines to set operating procedures for the operation.

### Applying to the Agricultural Operations Review Board

If a complaint cannot be resolved locally, the Agricultural Operations Review Board provides a process for reviewing the complaint. An application to the board, along with a fee, starts the process. No court action can be initiated by a complainant until 90 days after the application has been filed with the board. If the parties feel there is an opportunity to resolve the problem, mediation may be used to stop the 90-day clock.

If the complaint cannot be resolved, the Board will hold a hearing and issue a decision. Both parties will have an opportunity to make a presentation to the board and to be represented by legal counsel. Individuals retaining legal counsel will be responsible for their legal services. A decision of the board will be provided to both parties.

### Decision of the Agricultural Operations Review Board

The Board may dismiss the complaint if:

- the disturbance resulted from a normally-accepted agricultural practice;
- the complaint is trivial or not a nuisance;
- the application is frivolous, vexatious or was not made in good faith;
- the applicant does not have a sufficient personal interest in the subject matter or the application; and
- the applicant fails to recommend the operator, cease the practice causing the disturbance or modify the practice as set out in the recommendations consistent with the guidelines for normally-accepted agricultural practice.

### Recourse

If either party refuses to accept the decision of the board the matter can proceed to court. If the matter is referred to court, the court must give primary consideration to the board's decision.

# Appendices

## Appendix A: Agencies to Contact

### Saskatchewan Agriculture and Food

*Agricultural Operations, Inspection and Regulatory Management*

The Intensive Livestock provisions of *The Agricultural Operations Act* requires that operators of certain intensive livestock operations obtain approved waste storage and management plans.

An intensive livestock operation means the confining of any of the following animals (where the space per animal unit is less than 370 square metres): poultry, hogs, sheep, goats, cattle, horses, elk, mule deer, white-tail deer, fallow deer, bison or any other prescribed animals.

Approval is required for any intensive livestock operation which:

- contains an earthen manure storage area or lagoon;
- involves the rearing, confining or feeding of 300 or more animal units; or
- confines more than 20 animal units, but less than 300 animal units for more than 10 days in any 30-day period, within 300 metres of surface water or 30 metres of a domestic water well not controlled by the operator.

**Regina (306) 787-4680**
**Saskatoon (306) 933-5322** or **(306) 933-5095**
**Yorkton (306) 786-1505** or **(306) 786-5835**
**Weyburn (306) 848-2379** or **(306) 848-2833**

### Municipality

Municipalities may require one or more of the following:

- development or discretionary use of permits for establishing or expanding livestock operations;
- advertising and approval of zoning changes;
- input to subdivision approvals (if required) and subdivision servicing agreements;
- road maintenance cost agreements for heavy traffic on municipal roads;
- building setback distance from roads; and
- if within a Planning District, the recommendation of the Planning District.

Contact your local municipal administrator.

### SaskWater

SaskWater may require:

- a ground water investigation permit for drilling test wells;
- approval to construct and operate wells and use ground water;
- approval to construct and operate earth works and use of surface water;
- approval to construct in reservoir development areas; and
- approval to alter drainage.

**North Battleford (306) 446-7450**
**Nipawin (306) 862-1750**
**Yorkton (306) 786-1494**
**Weyburn (306) 848-2345**
**Swift Current (306) 778-8263**

### Saskatchewan Environment and Resource Management (SERM)

Incinerators require approval from The Air Quality Section, Commercial Branch.

**Regina (306) 787-6178**

Large intensive livestock operations may require prescreening under *The Environmental Assessment Act*.

**Regina (306) 787-6133**

### Saskatchewan Highways and Transportation

A specified setback distance may be required if a highway is located adjacent to the project site. Contact your Saskatchewan Highways and Transportation district office.

### Saskatchewan Municipal Affairs and Housing

Approval from Municipal Affairs' is required if the site is to be subdivided.

**Regina Region**
**Community Planning (306) 787-2725**

**Saskatoon Region**
**Community Planning (306) 933-6937**

**Northern Saskatchewan**
**Community Planning (306) 953-2400**

## Saskatchewan Health

Development of a livestock operation within one mile of an urban center may require approval of the local health district. Please contact the senior public health inspector responsible for the area where the proposal is located.

In most cases, information provided to the local health authority through the referral process under the Intensive Livestock Provisions will be sufficient; however, early contact with the senior public health inspector may avoid unexpected delays.

**Manager**
**Public Health Inspection**
3475 Albert Street
Regina, Saskatchewan
S4S 6X6 **(306) 787-7129**

**Swift Current Health District**
350 Cheadle Street West
Swift Current, Saskatchewan
S9H 4G3 **(306) 778-5417**

**Moose Jaw-Thunder Creek Health District**
107 - 110 Ominica Street West
Moose Jaw, Saskatchewan
S6H 6V2 **(306) 694-3680**

**South Central Health District**
110 Souris Avenue
Weyburn, Saskatchewan
S4H 2Z9 **(306) 848-2329**

**Regina Health District**
104 - 4211 Albert Street
Regina, Saskatchewan
S4S 3R6 **(306) 766-7714**

**East Central Health District**
72 Smith Street East
Yorkton, Saskatchewan
S3N 2Y4 **(306) 786-0618**

**Prince Albert Health District**
Box 3003
Prince Albert, Saskatchewan
S6V 5G1 **(306) 953-5631**

**North Central Health District**
Box 650
Melfort, Saskatchewan
SOE 1AO **(306) 752-6321**

**Battlefords Health District**
Room 204, Prov. Bldg. 1146 - 102nd St.
North Battleford, Saskatchewan
S9A 1E9 **(306) 446-6418**

**Midwest Health District**
Box 1300
Rosetown, Saskatchewan
SOL 2VO **(306) 882-6423**

**Saskatoon Health District**
101-310 Idylwyld Drive North
Saskatoon, Saskatchewan
S7K 2H6 **(306) 655-4142**

**Director of Environmental Health**
**Northern Health Services Branch**
Box 5000
La Ronge, Saskatchewan
SOJ 1LO **(306) 425-4522**

## Appendix B: Animal Units

| Type | Kind of Animal | Number which equals One Animal Unit |
|---|---|---|
| ***Beef or dairy cattle*** | | |
| | Cows or bulls | 1.0 |
| | Feeder cattle | 1.5 |
| | Replacement heifers | 2.0 |
| | Calves | 4.0 |
| ***Hogs*** | | |
| | Boars or sows | 3.0 |
| | Gilts | 4.0 |
| | Feeder pigs | 6.0 |
| | Weanling pigs | 20.0 |
| ***Poultry*** | | |
| | Hens, cockerels, capons | 100.0 |
| | Chicks, broilers | 200.0 |
| | Turkeys, geese, ducks | 50.0 |
| ***Sheep*** | | |
| | Rams or ewes | 7.0 |
| | Lambs | 14.0 |
| ***Goats*** | | |
| | Does or bucks | 7.0 |
| ***Horses*** | | |
| | Colts or ponies | 2.0 |
| | Other than colts or ponies | 1.0 |
| ***Bison*** | | |
| | Cows or bulls | 1.0 |
| | Calves | 4.0 |
| ***Elk*** | | |
| | Cows or bulls | 5.0 |
| | Elk calves | 20.0 |
| ***Deer*** | | |
| | Does or bucks | 8.0 |
| | Deer fawns | 32.0 |

## Agricultural Operations Regional Specialists
## Inspection and Regulatory Management

**Saskatoon Rural Service Centre**
3735 Thatcher Ave.
Saskatoon, SK
S7K 2H6

Bill Henley, P. Eng.
(306) 933-5095

Ken McKnight, P.Eng.
(306) 933-5322

Wendi Dehod, E.I.T.
(306) 933-8343

**Yorkton Rural Service Centre**
38 - 5th Ave. N.
Yorkton, SK
S3N 0Y8

Brian Campbell, P. Eng.
(306) 786-1505

Darren Stovin, E.I.T.
(306) 786-5835

**Weyburn Rural Service Centre**
110 Souris Avenue
Box 2003
Weyburn, SK
S4H 2Z9

Randy Vopni, P. Eng.
(306) 848-2379

Lisa White, E.I.T.
(306) 848-2833